



Armed Forces College of Medicine AFCM



Brainstem I

Medulla

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INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

- 1. Describe gross morphology of ventral and dorsal aspects of MEDULLA OBLONGATA**
- 2. Describe the internal structure and correlated functions of the different levels of medulla.**
- 3. Describe superficial attachments of cranial nerves.**
- 4. Describe blood supply of medulla .**
- 5. Correlate the vascular distribution with the**

BRAIN STEM



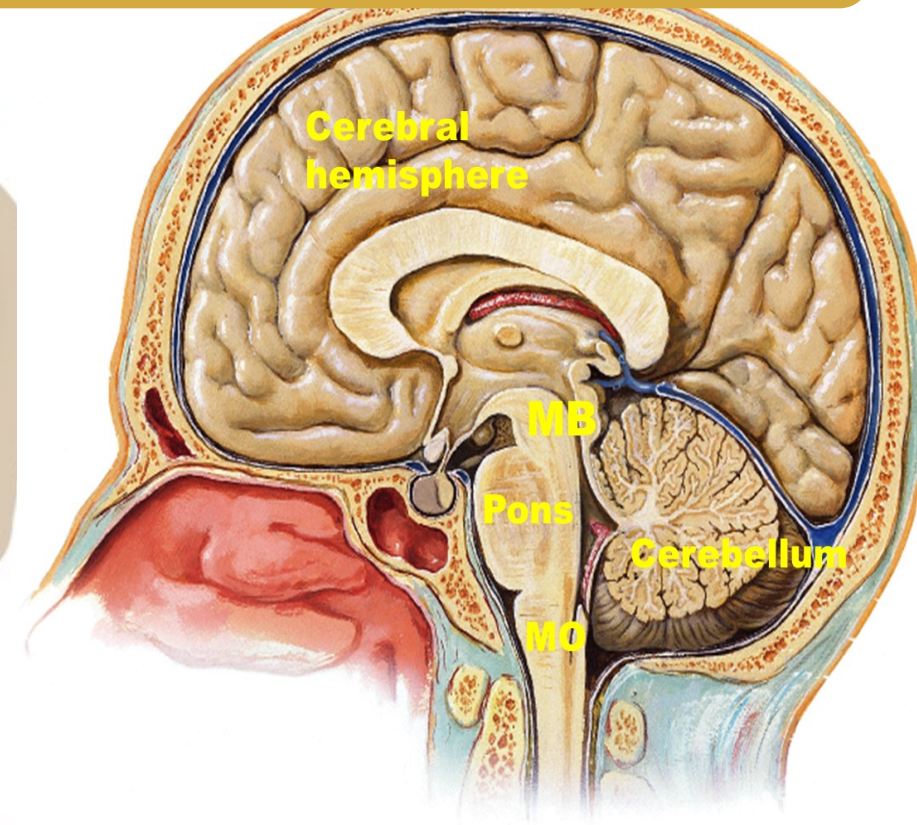
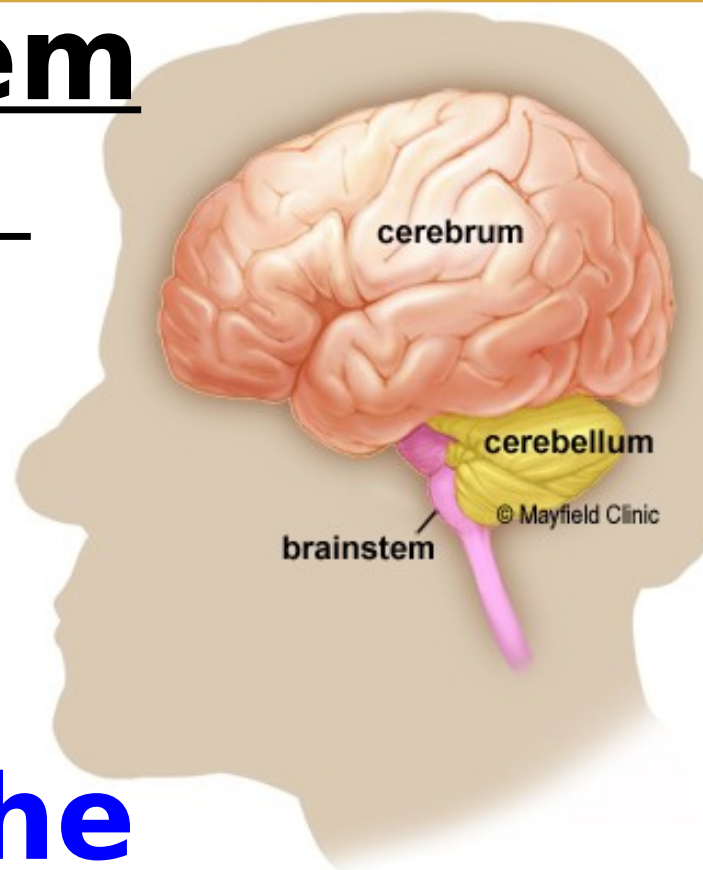
The brain stem
is formed of:

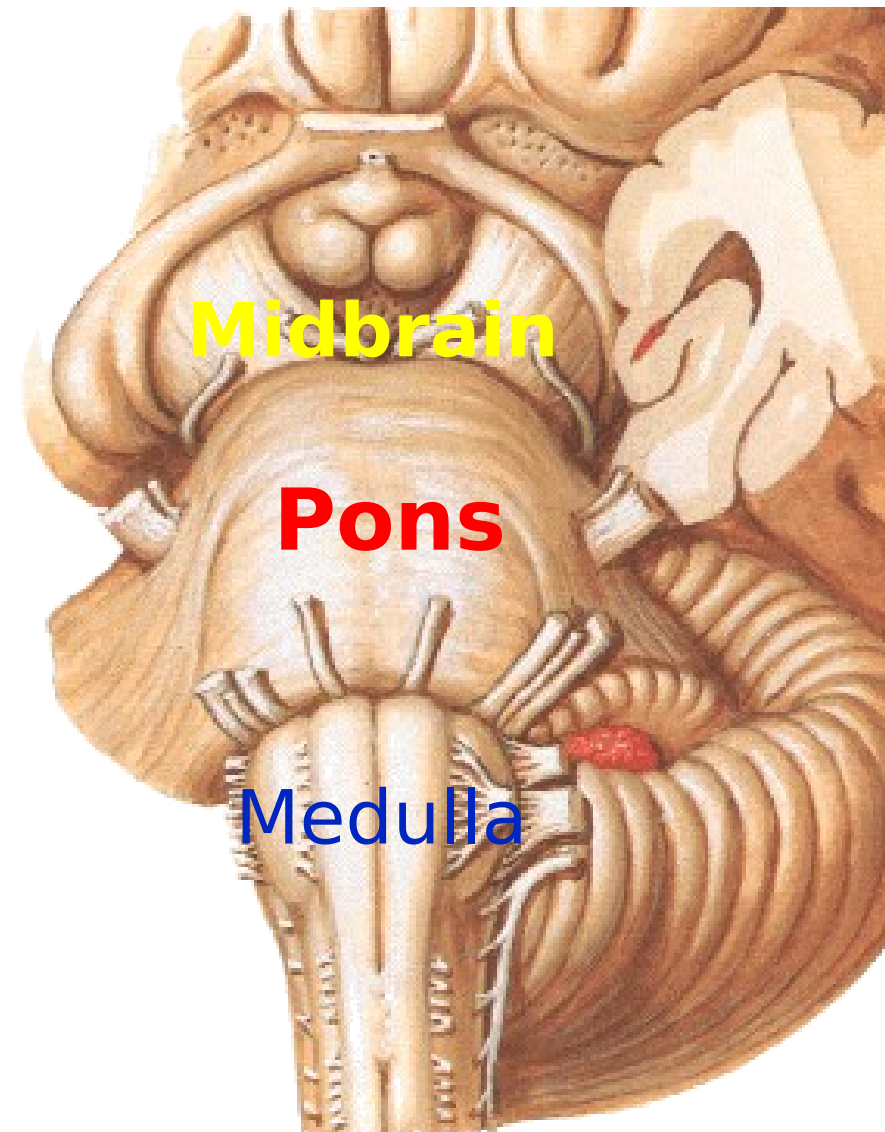
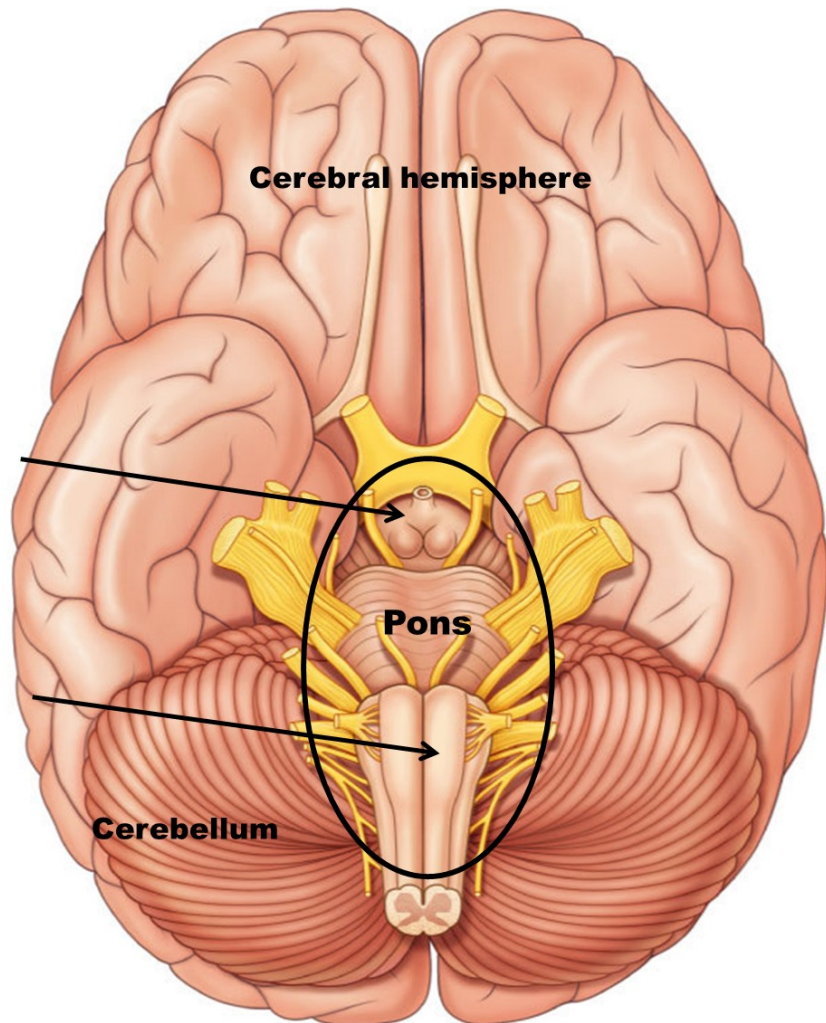
I. midbrain

II. Pons

**III. medulla
oblongata.**

**It connects the
Cerebral
Hemispheres
with the**

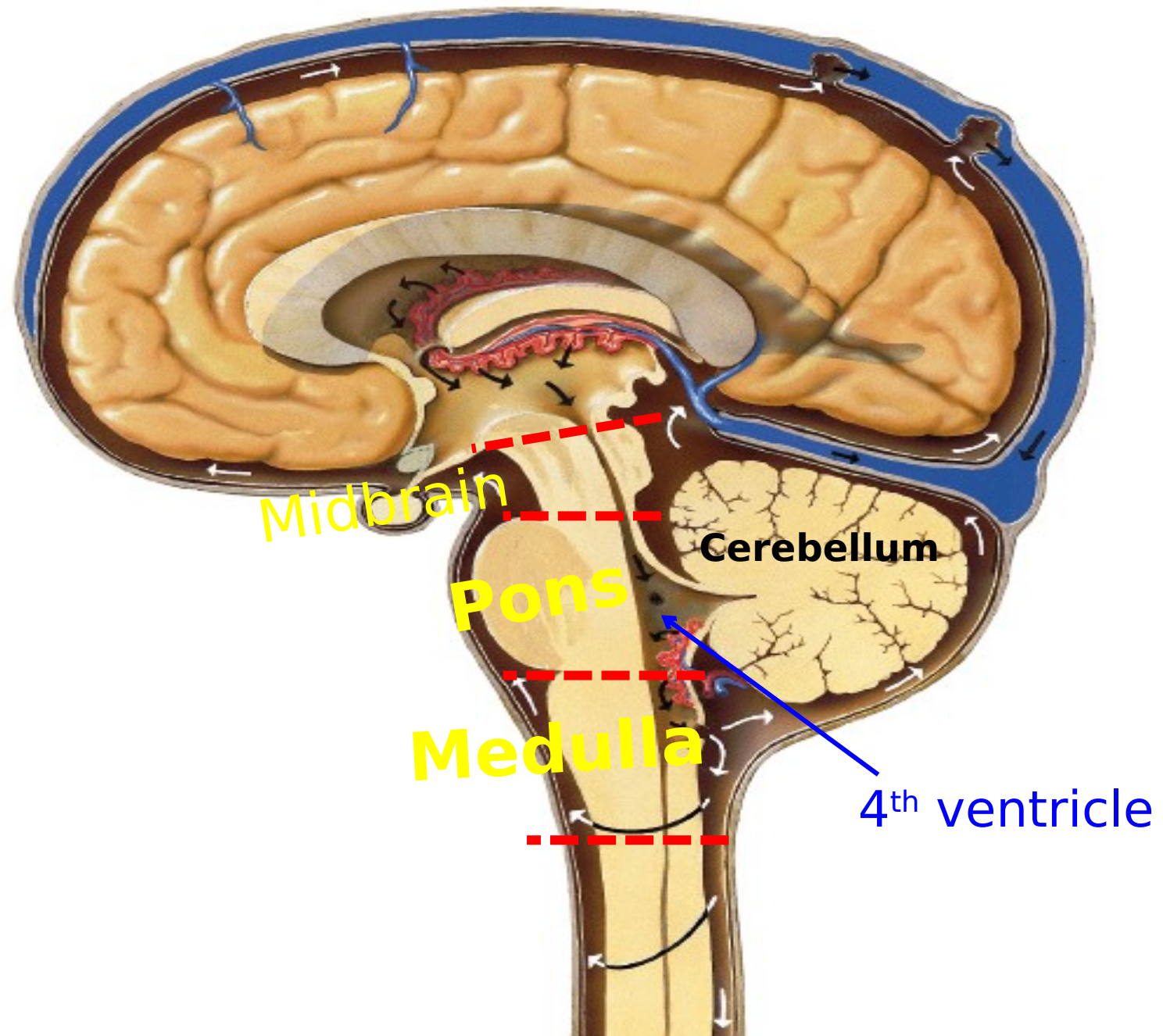




Medulla oblonga

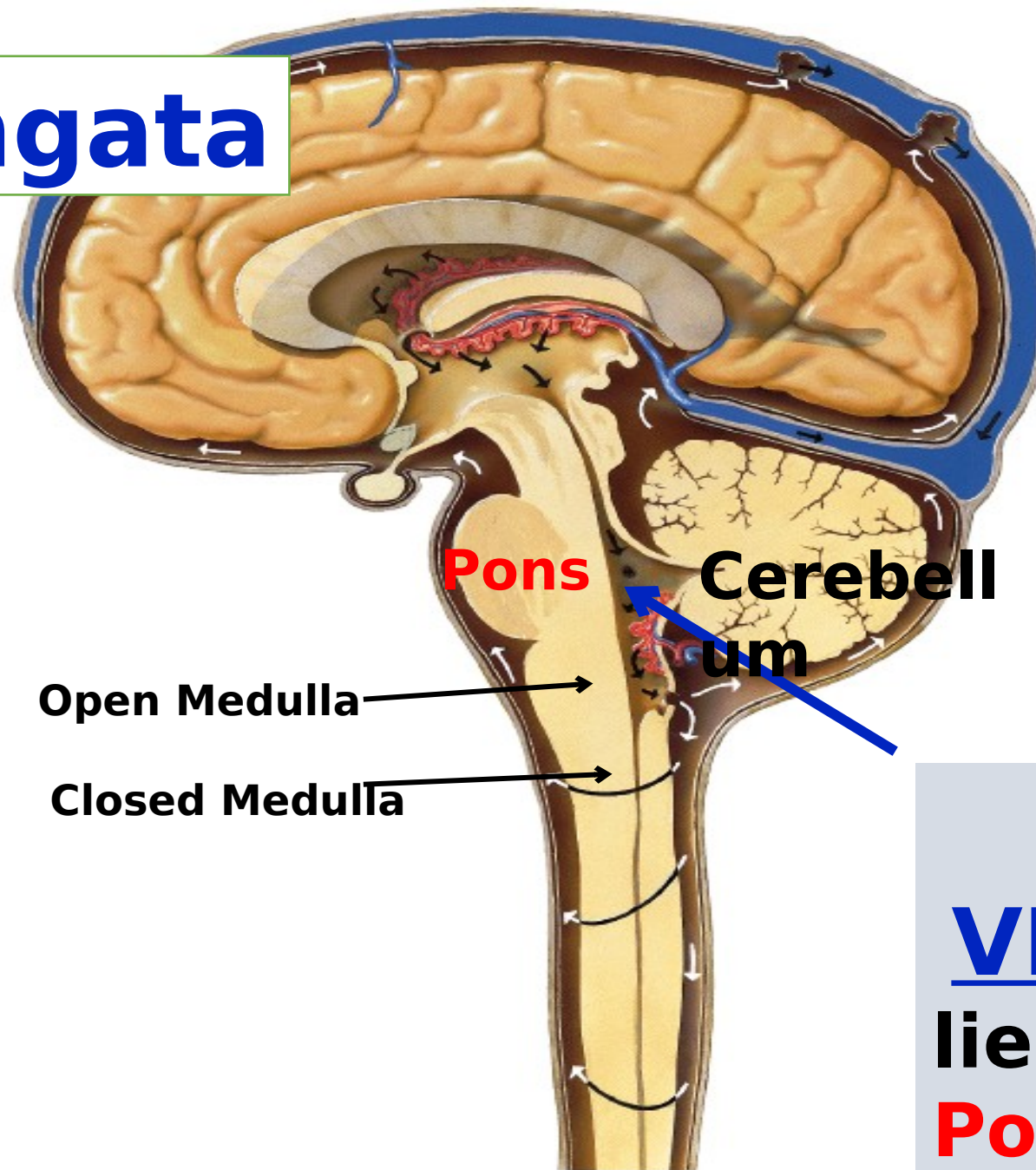
EXTENSION:

from the lower
border of the
foramen magnum
below
to the lower border
of the pons above



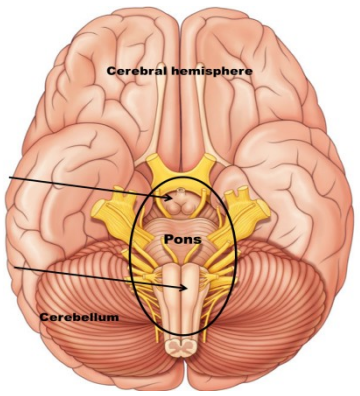
Medulla oblongata

1) Open Medulla:
*Is the upper part.
*Opposite the 4th ventricle
(forms the lower part of its floor)



4TH
VENTRICLE
lies inbetween
Pons & Medulla

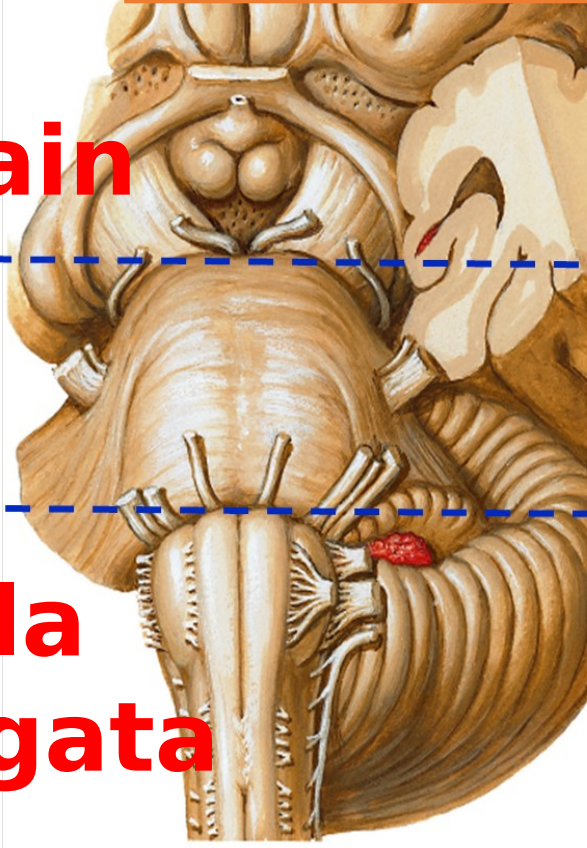
SURFACES OF BRAIN STEM



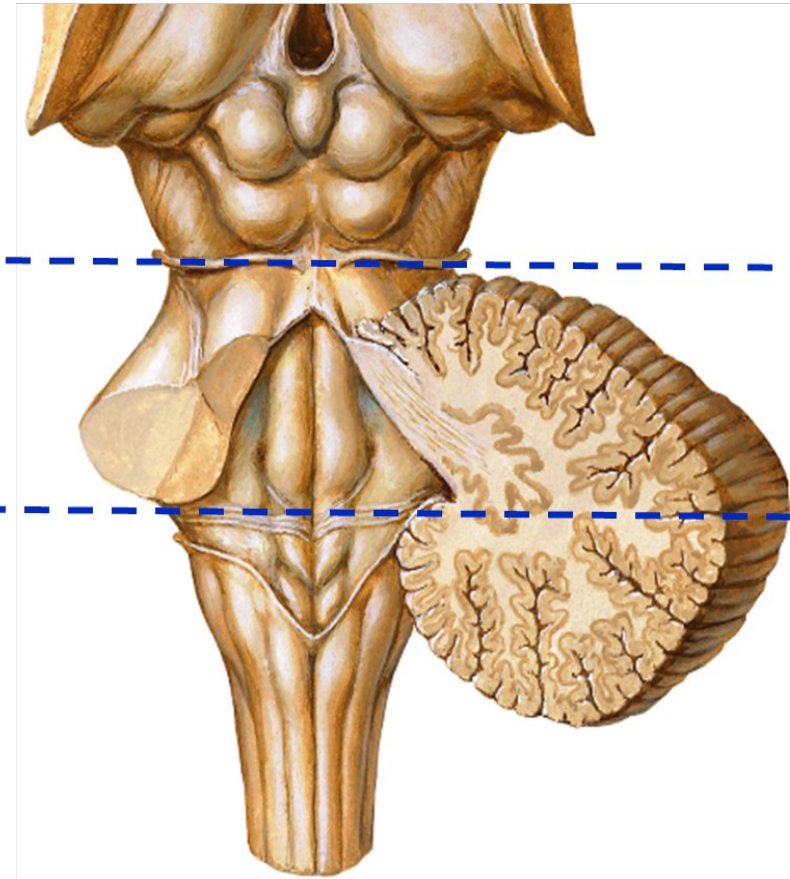
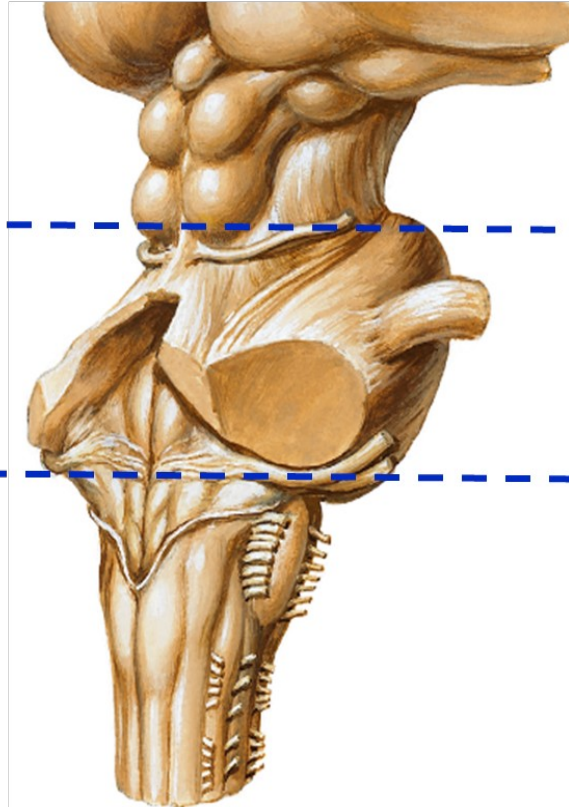
■ **Midbrain**

■ **Pons**

■ **Medulla Oblongata**



**Anterior
surface**



**Posterior
surface**

Ventral Surface of Medulla Oblongata

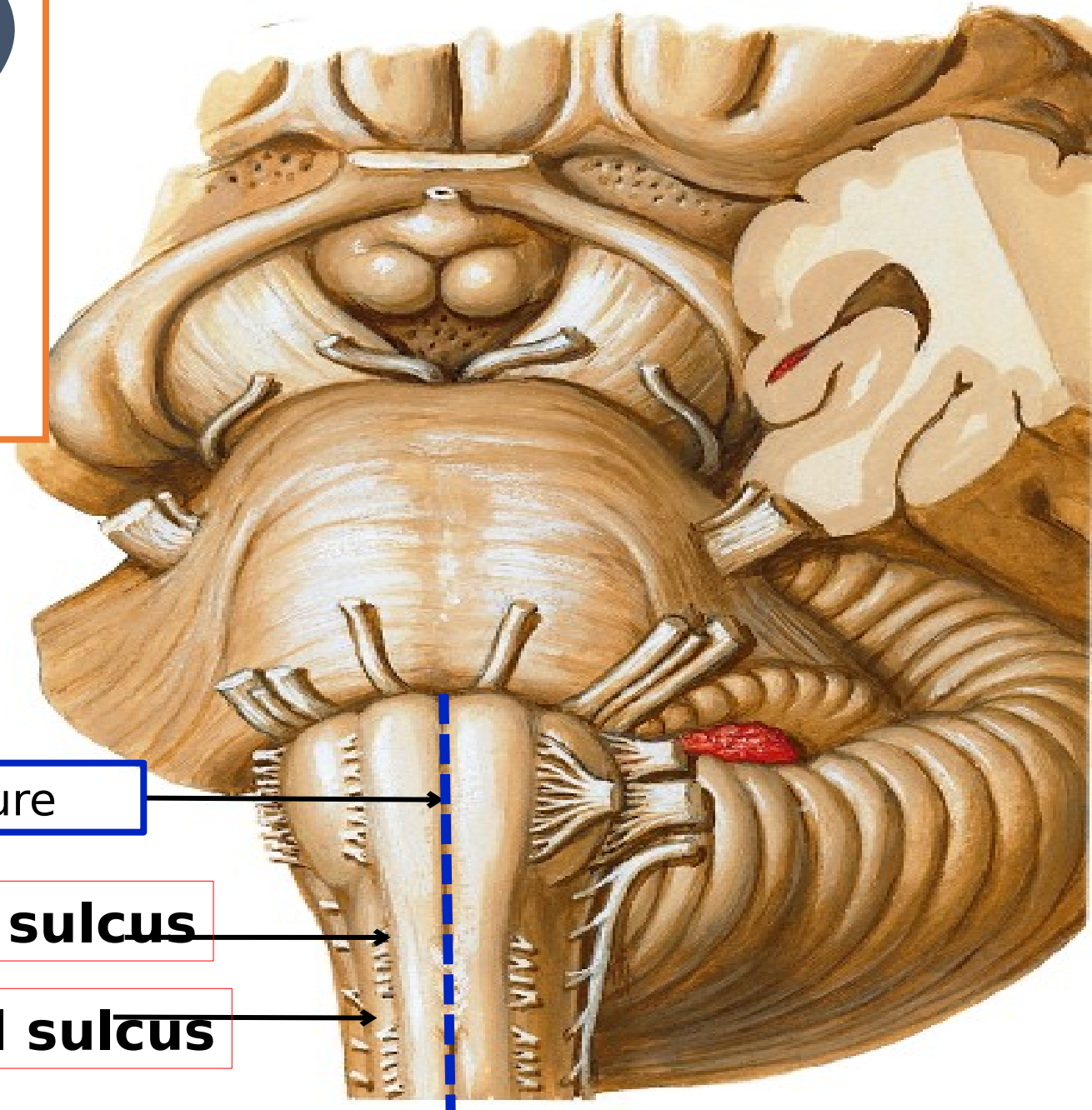
Ventral (Anterior) surface of Medulla Oblongata

**Medulla
Oblongata**

Antero-Median fissure

Antero-lateral sulcus

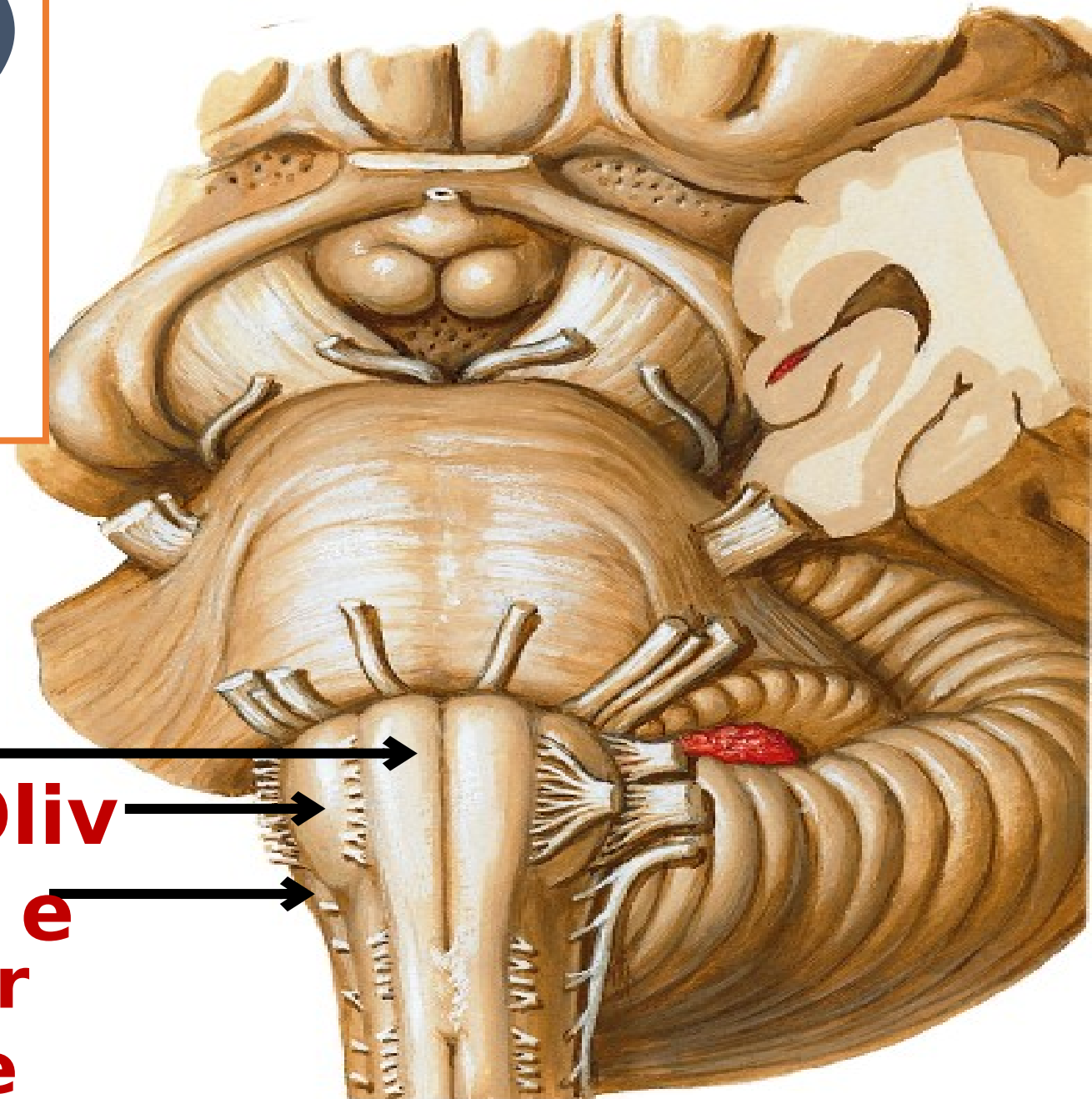
postero-lateral sulcus



Ventral (Anterior) surface of Medulla Oblongata

Medulla
Oblongata

Pyramid
Oliv
Inferior e
Cerebellar
Peduncle



Posterior Surface of Medulla Oblongata

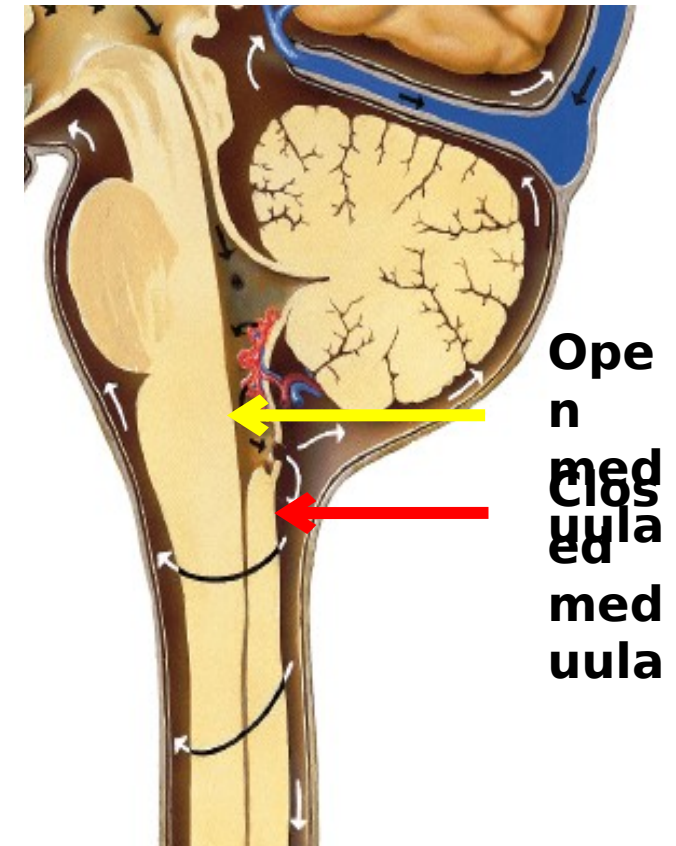
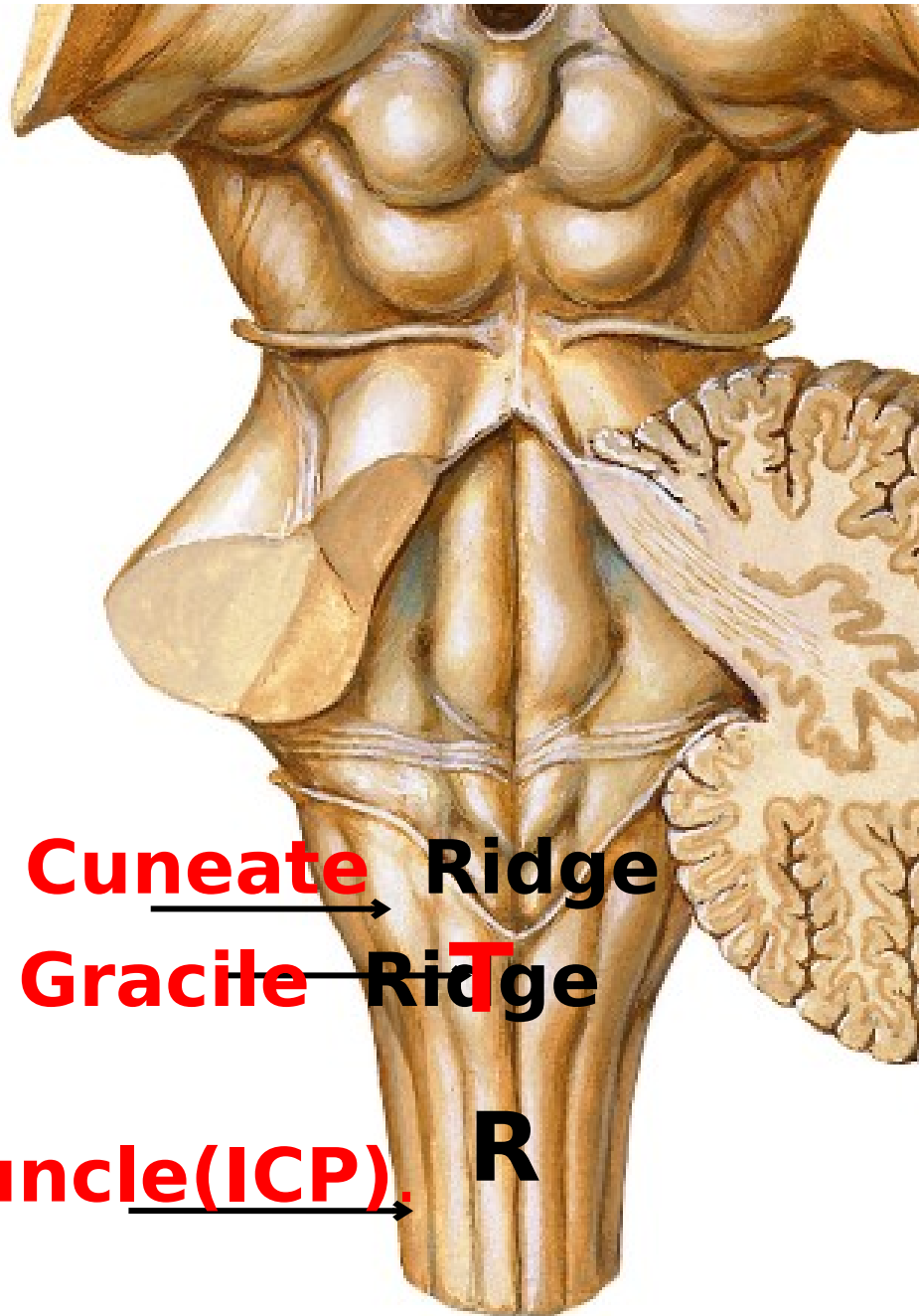
Posterior Surface of Medulla Oblongata

A-closed medulla:

Cuneate Tubercle & Cuneate Ridge

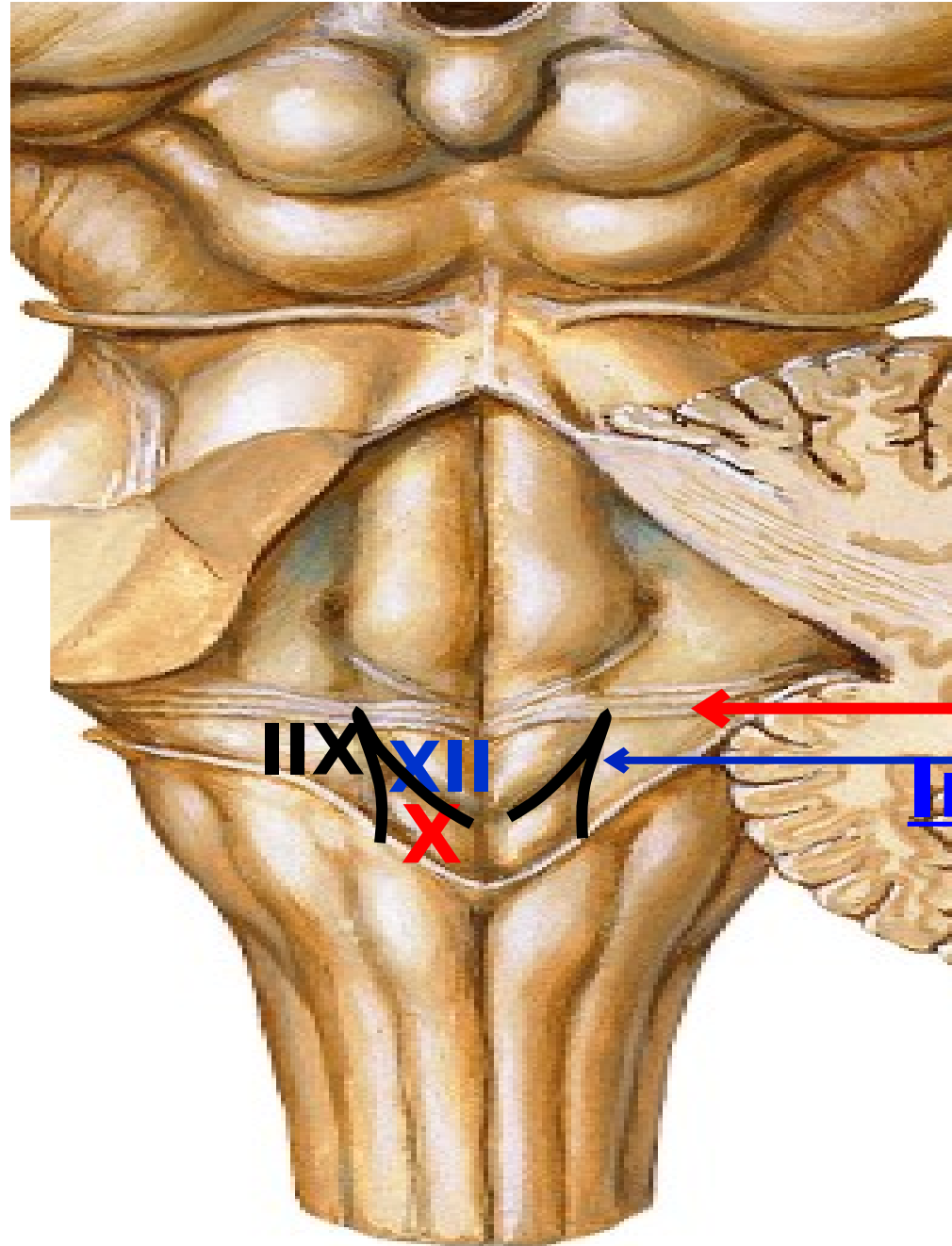
Gracile Tubercle & Gracile Ridge

Anterior cerebellar peduncle(ICP). R

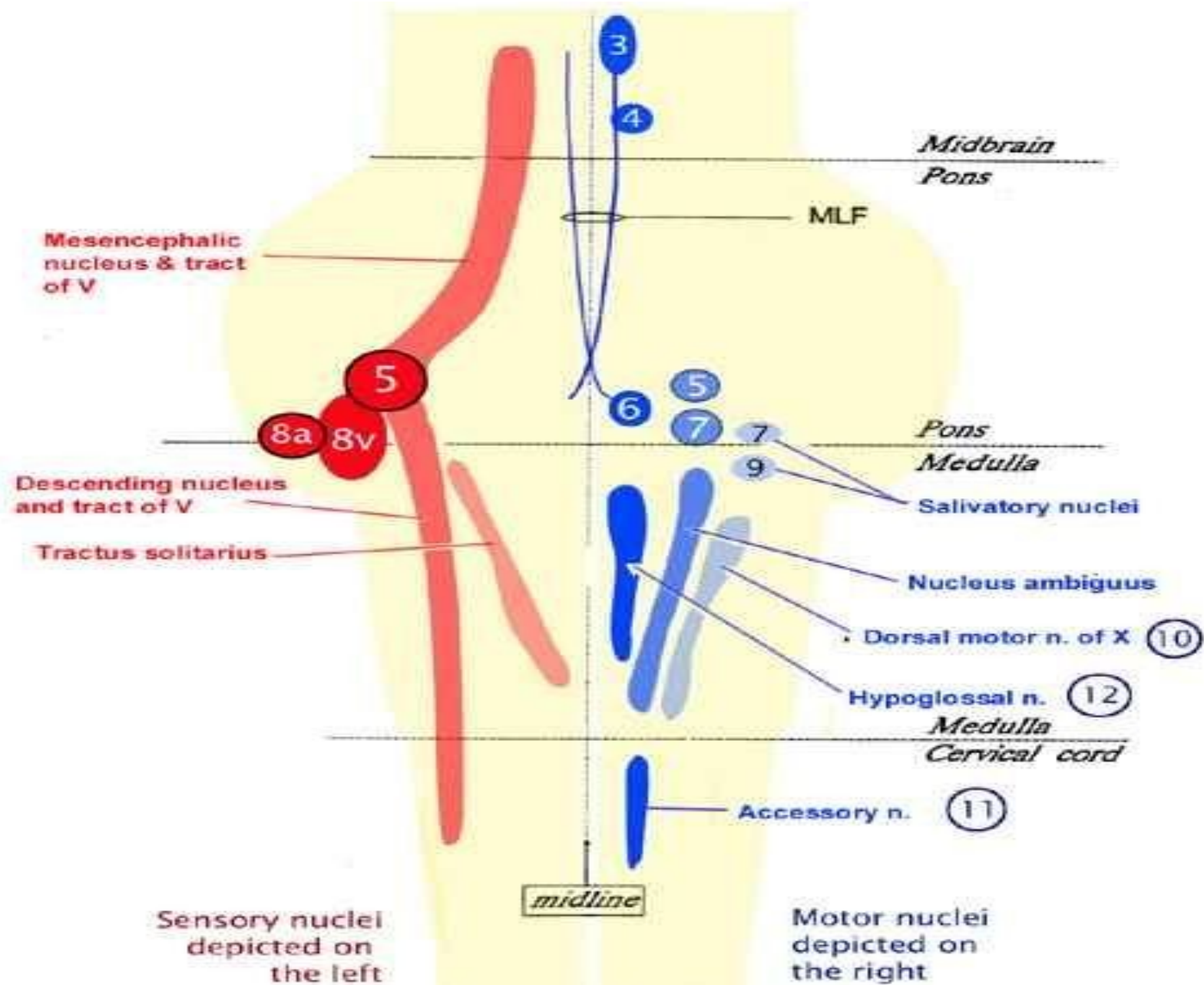


Posterior Surface of Medulla Oblongata

- ❑ **medullary stria** (horizontal fibers)
- ❑ **Depressed sulcus :**
Inferior fovea
an inverted V-shaped depression.
- ❑ **3 areas =**
trigone :



Medullary St
Inferior fovea



Brainstem Cranial Nerve Nuclei

1-Closed Medulla (Motor #)

Gracile tract&nucleus

Cuneate tract&nucleus

Trigeminal tract&nucleus

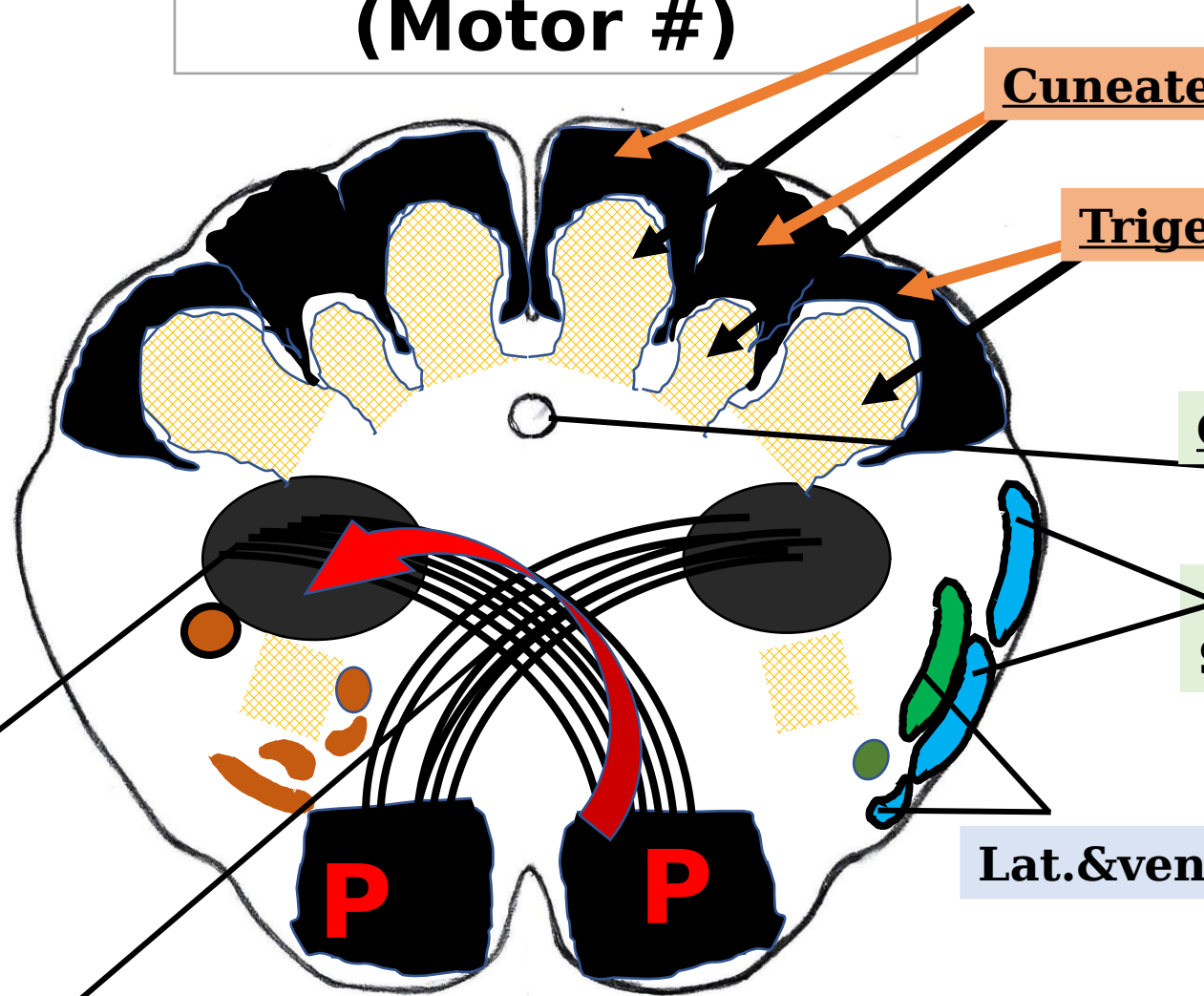
Central canal

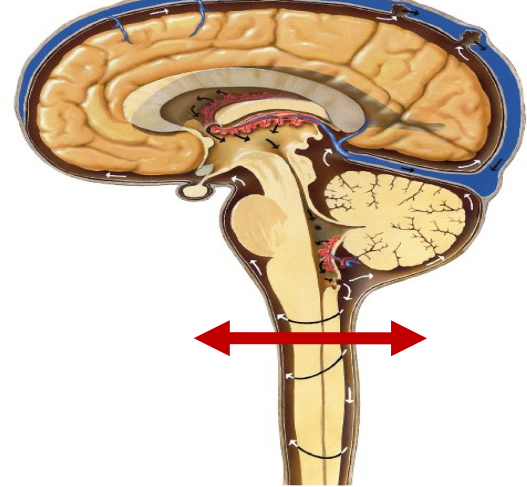
Dors & Ven.
Spino-cerebellar

Lat.&vent.spinothalamic

Lat. corticospinal

Decussation of the pyramid

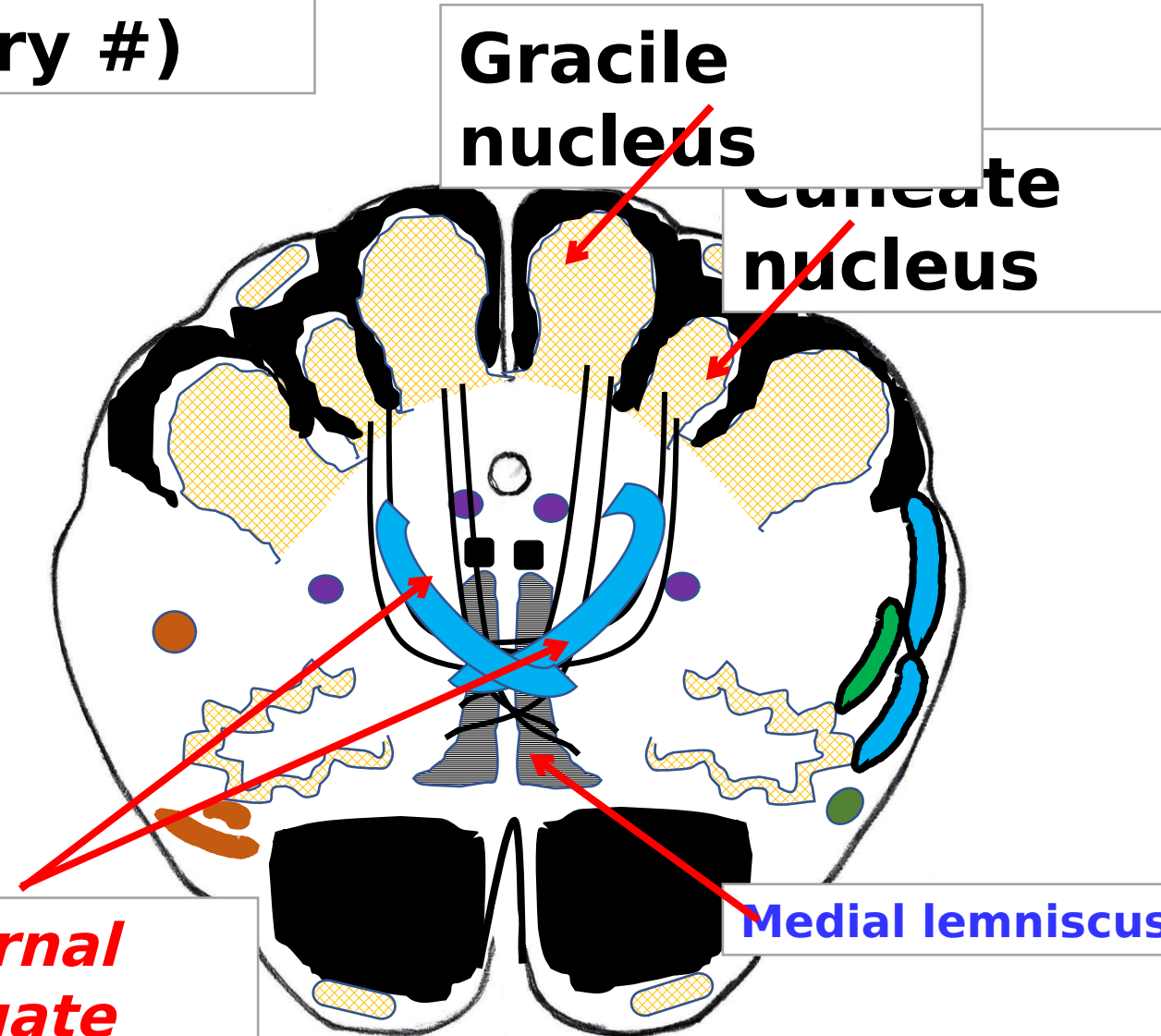




2-Closed Medulla (Sensory #)

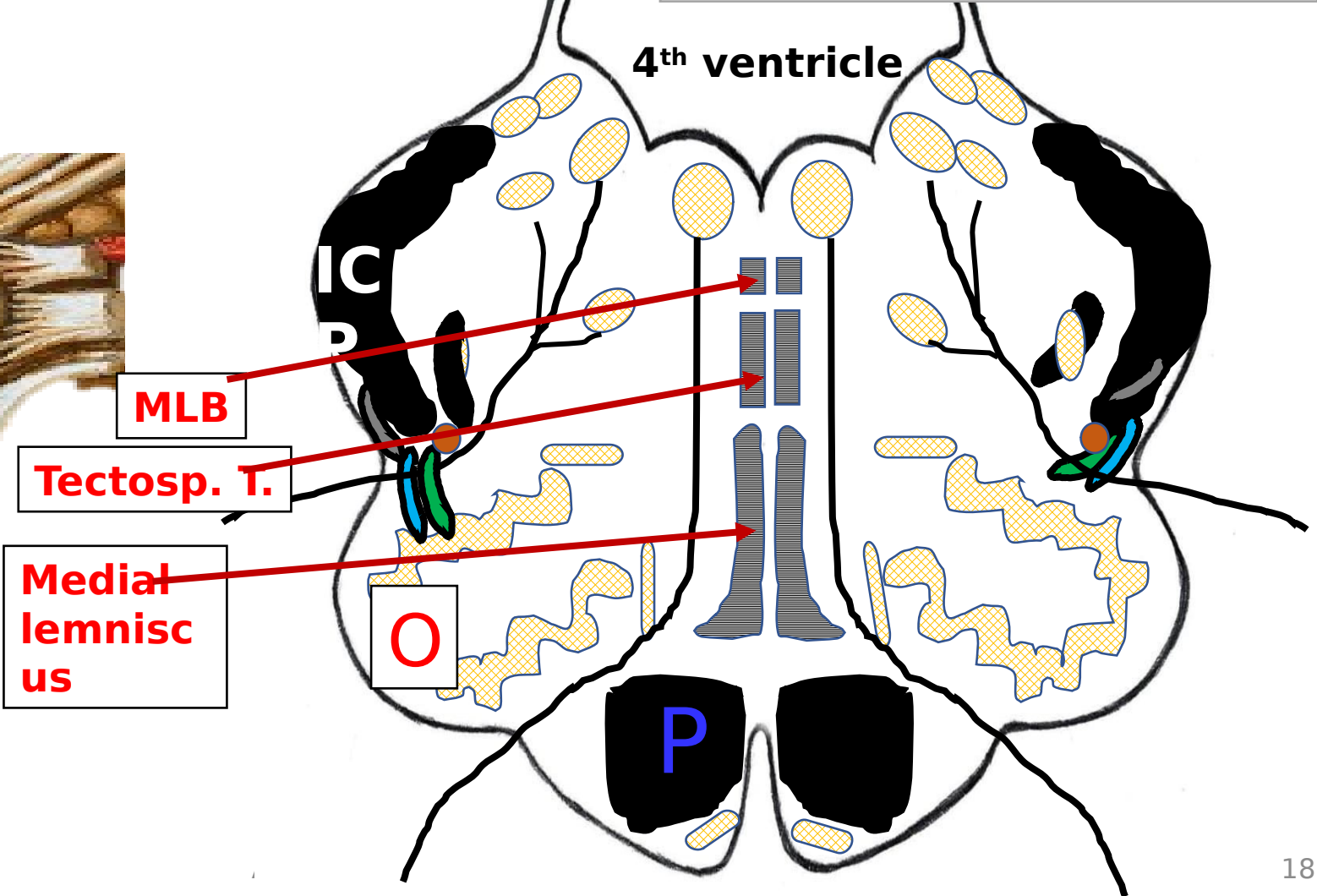
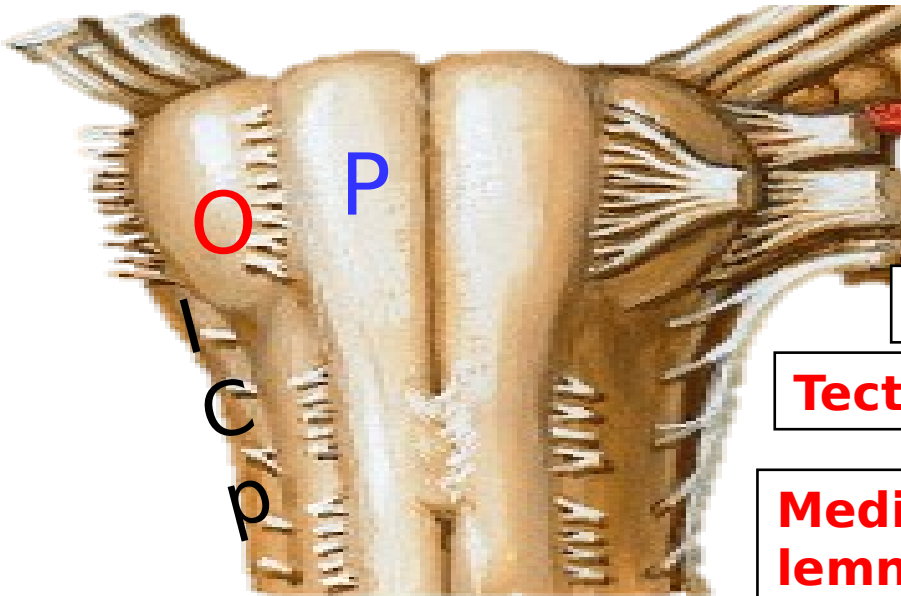
Internal arcuate fibers

- Axons of gracile and cuneate nuclei curve anteriorly forming internal arcuate fibers
- Decussate with the fibers of the opposite side
- After decussation fibers ascend as the **medial**



3-Open Medulla (ventral surface)

Transverse section



T.S. Open Medulla

□ Olivary complex

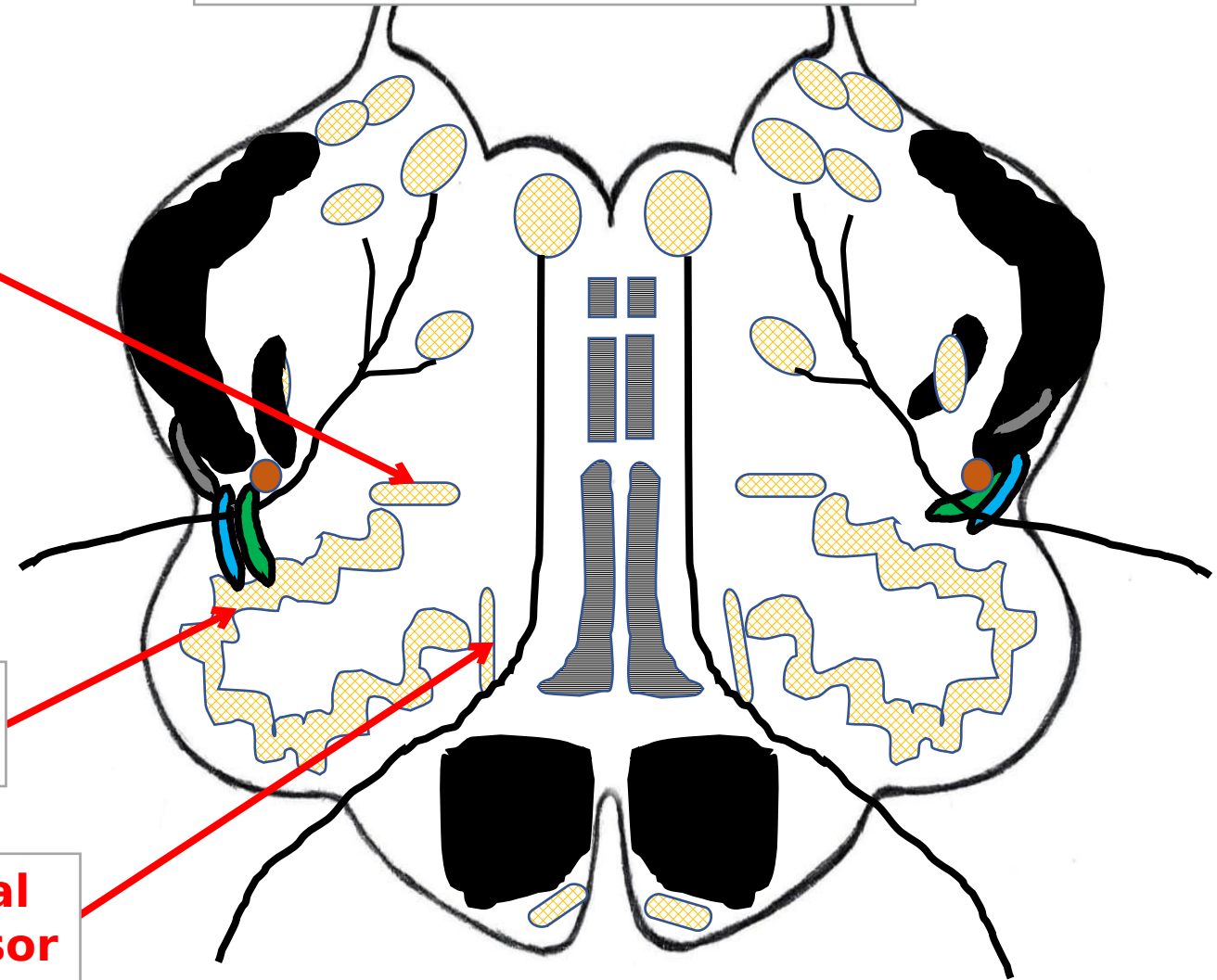
OLIVARY NUCLEI (3 in number)

1. Inferior Olivary nucleus
2. Dorsal Accessory Olivary nucleus
3. Medial Accessory Olivary nucleus

Dorsal Accessory

Inferior olivary

Medial Accessory



Department

❑ Olivary complex

Involved in control of muscle tone, motor learning and coordination of Voluntary movements

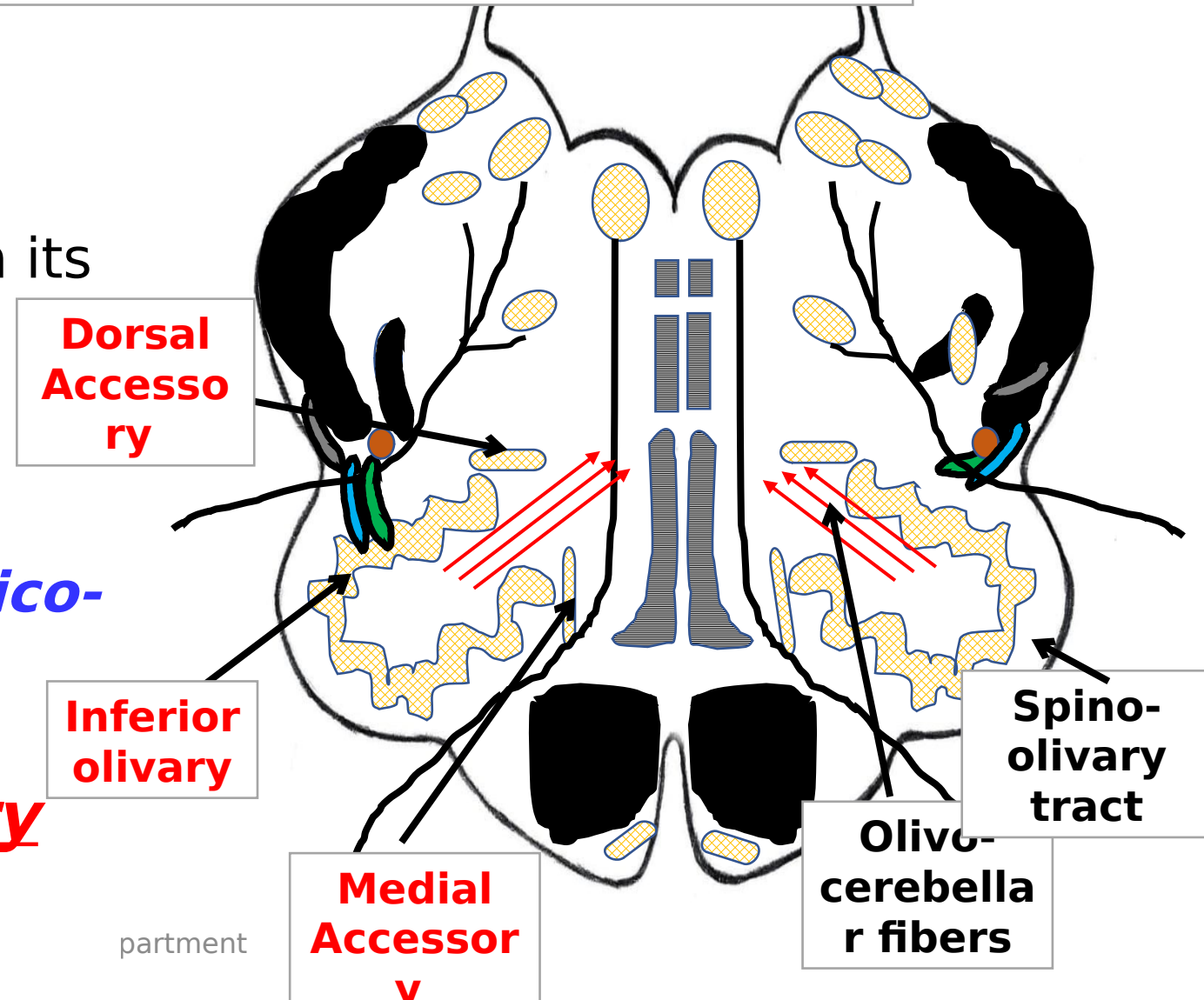
➤ Inferior olive:

It is the largest, lies in the open medulla & appears corrugated with its hilus facing dorso-medially.

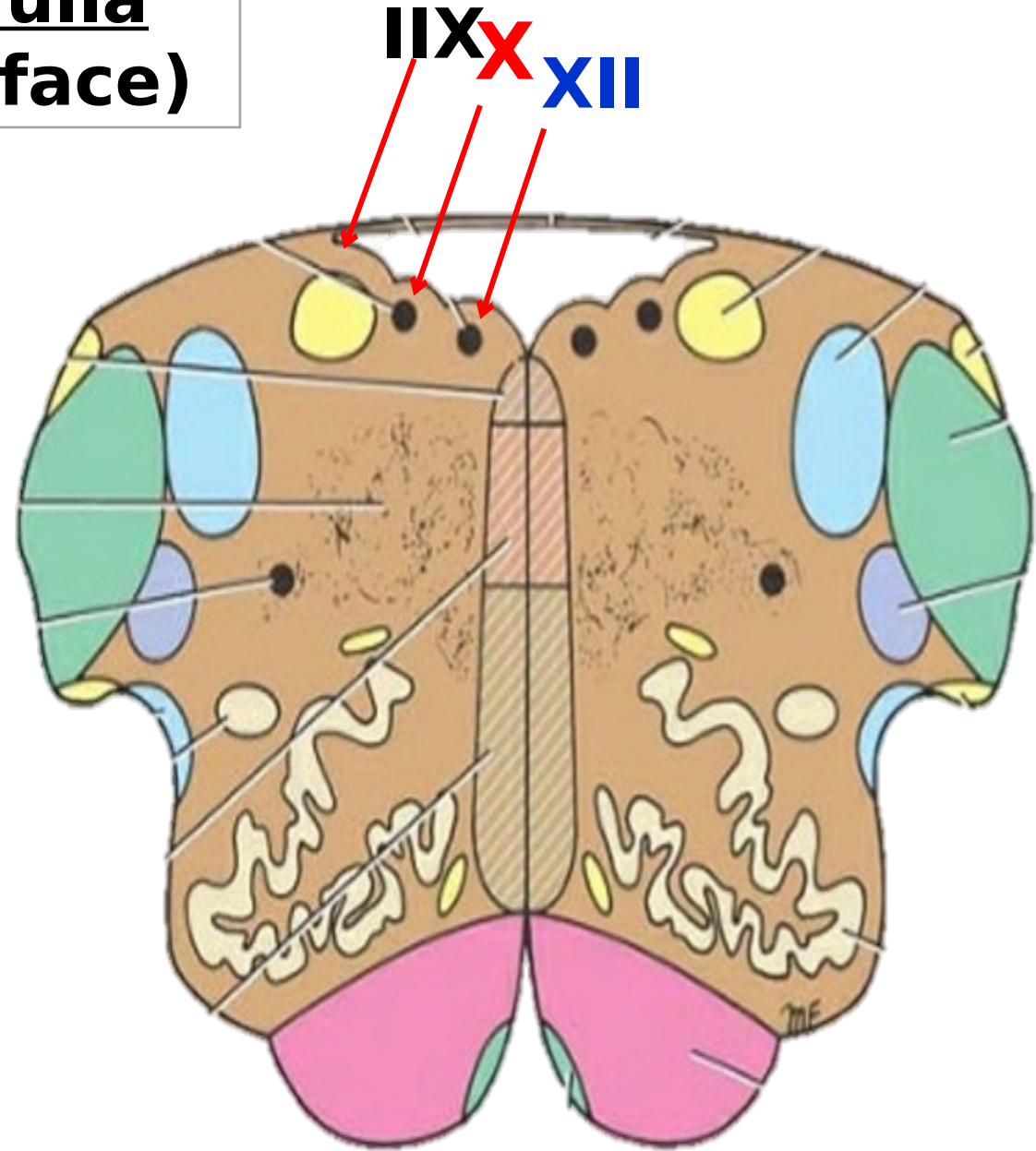
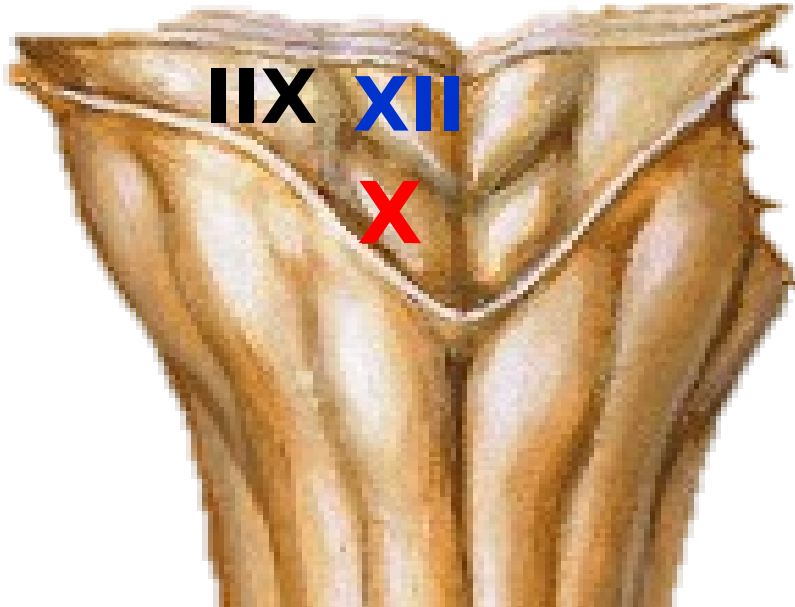
- Afferent: 1. Spinal cord (**Spino-olivary tract**)
2. Cerebral cortex (**Cortico-olivary fibers**)

➤ Dorsal & medial accessory olives:

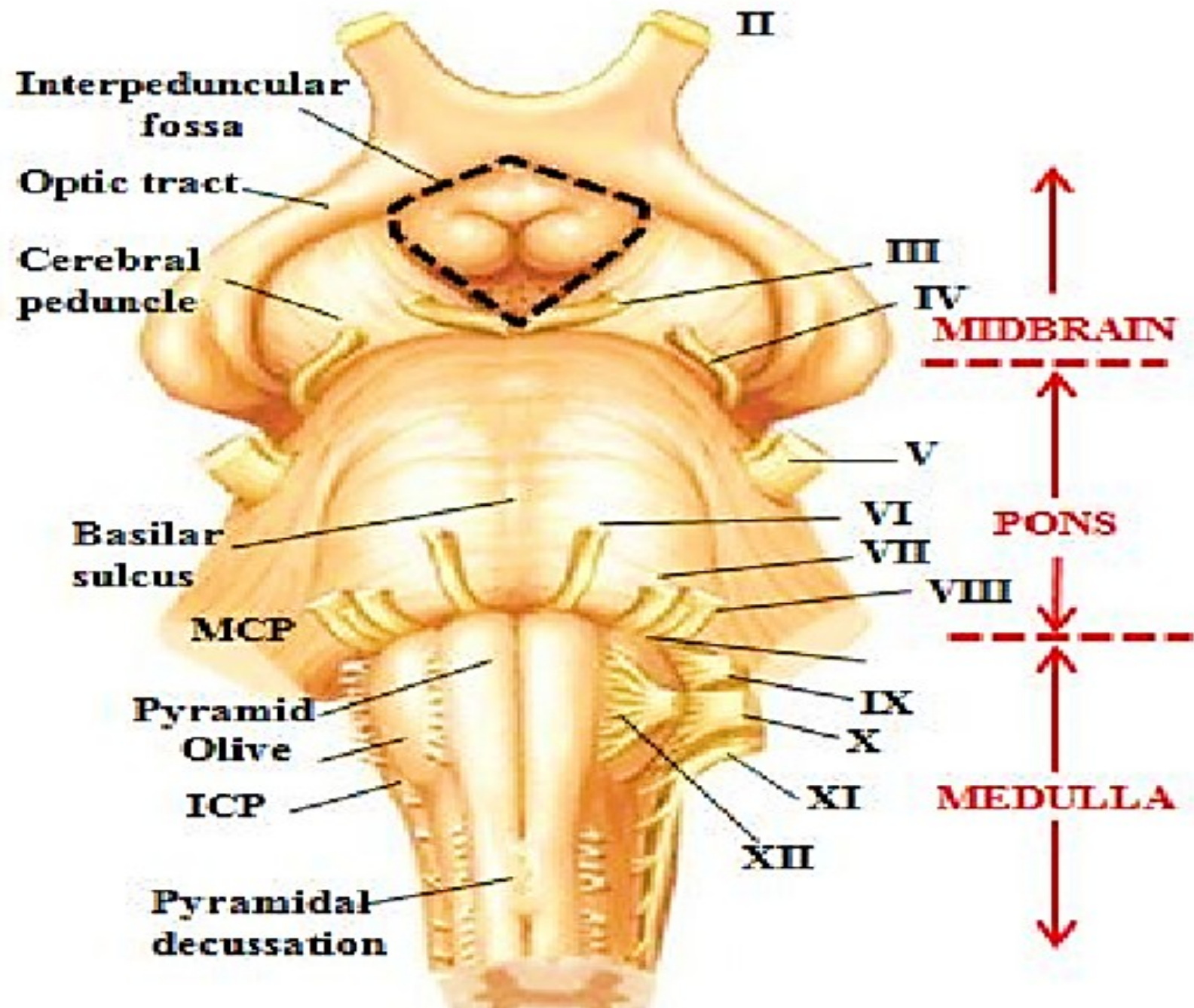
Send proprioceptive fibers to



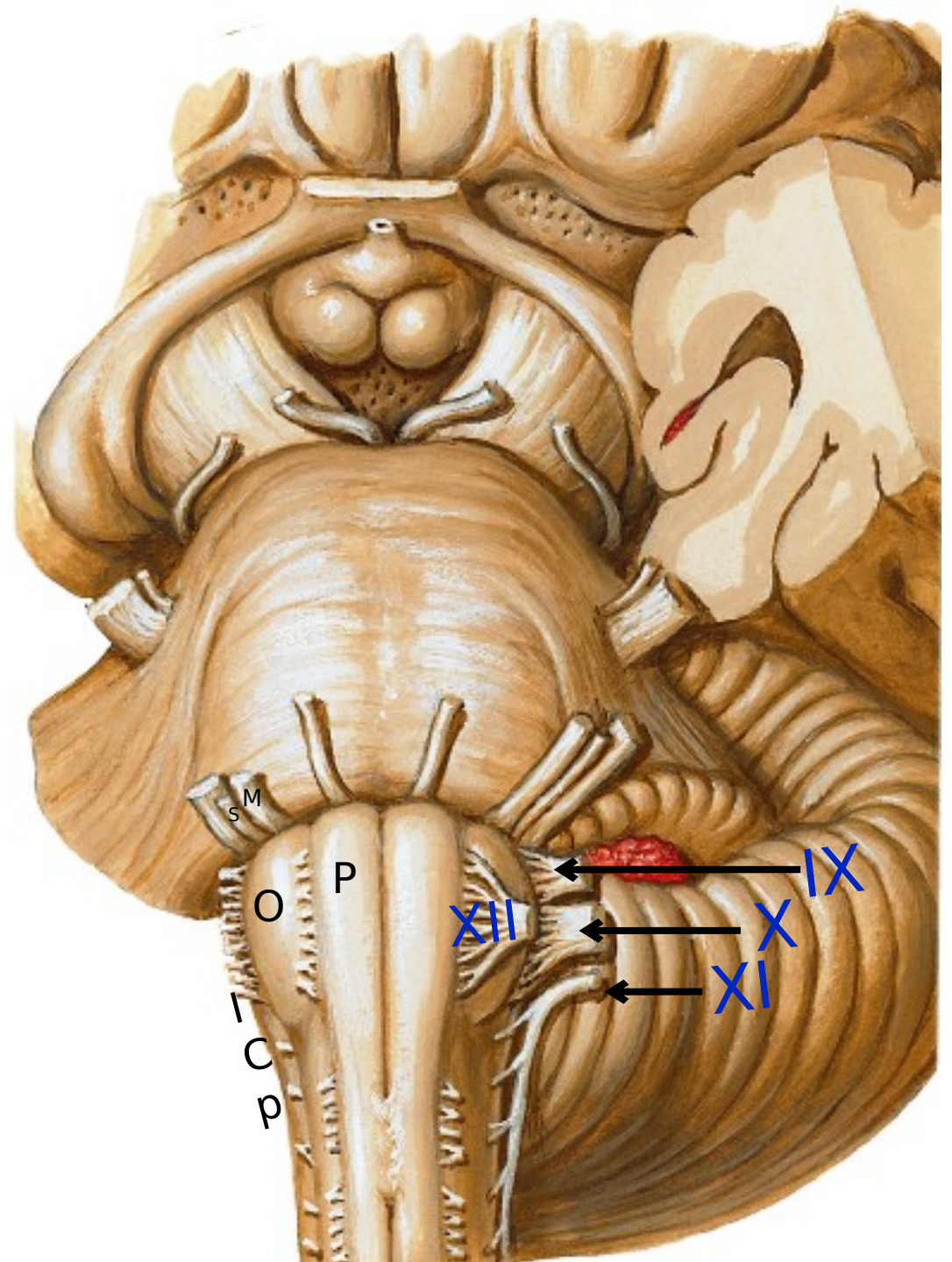
Open Medulla (Dorsal surface)



- 1. Hypoglossal Trigone:** overlies hypoglossal nucleus.
- 2. Vagal Trigone:** overlies dorsal vagal nucleus



- ☐ Glossopharyngeal (9th)
- ☐ Vagus (10th)
- ☐ Accessory (11th) } exit between olive and CP
- ☐ Hypoglossal (12th) } exit between pyramid and olive



Cranial nerves nuclei at the level of open medulla

**1-Dorsal vagal nucleus
(parasympathetic)**

**XII CN
nuclei
Hypoglossa
I
(supply tongue
ms)**

**Vestibular
Nuclei = VIII CN**

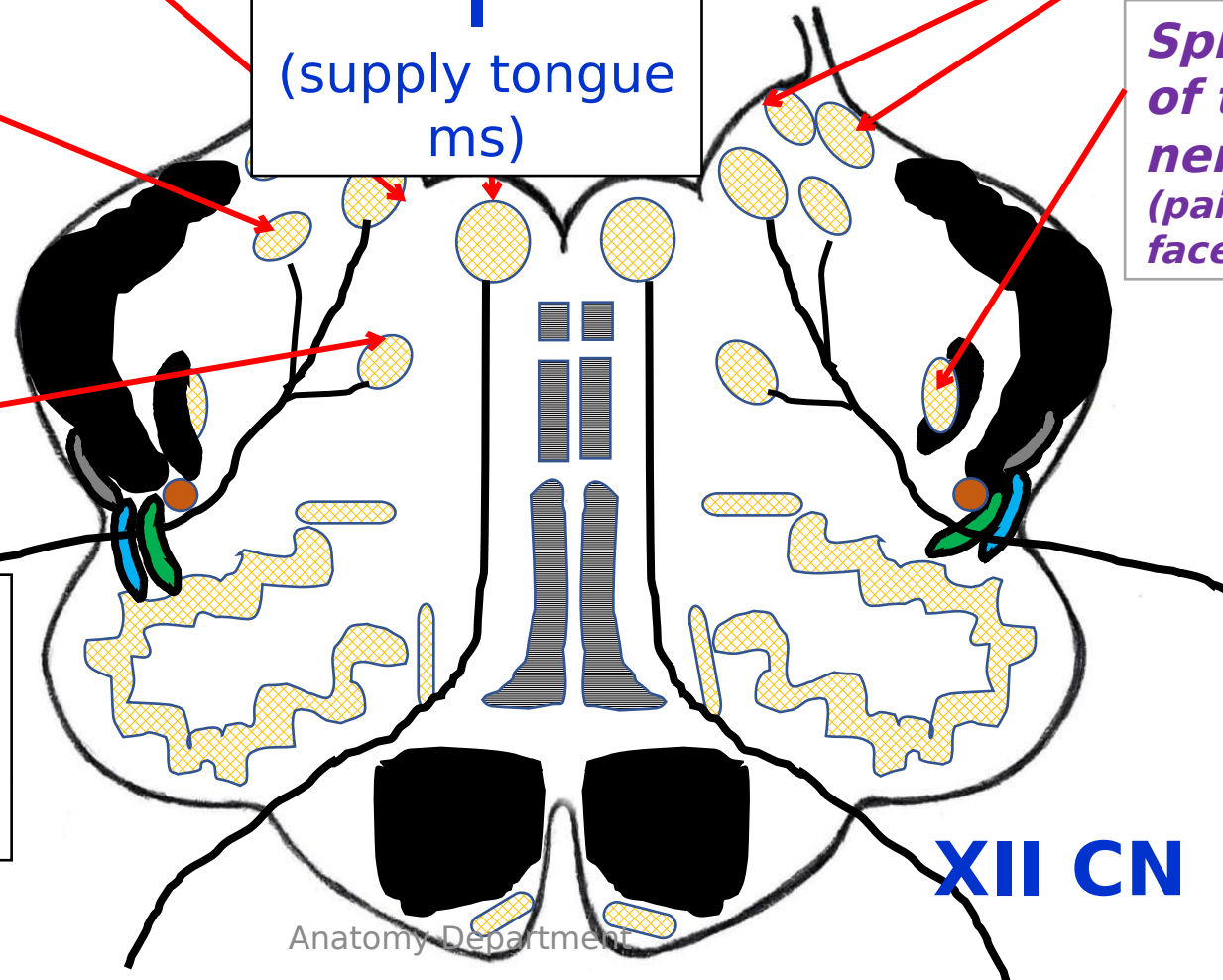
**Spinal nucleus
of trigeminal
nerve
(pain & temp. from
face)**

**2-Nucleus
solitarius
(taste
sensation)**

**3-Nucleus
ambiguus
gives motor
fibers to IX, X,
XI (ms of
pharynx, larynx,
palate)**

**X CN =
Vagus
nerve**

XII CN

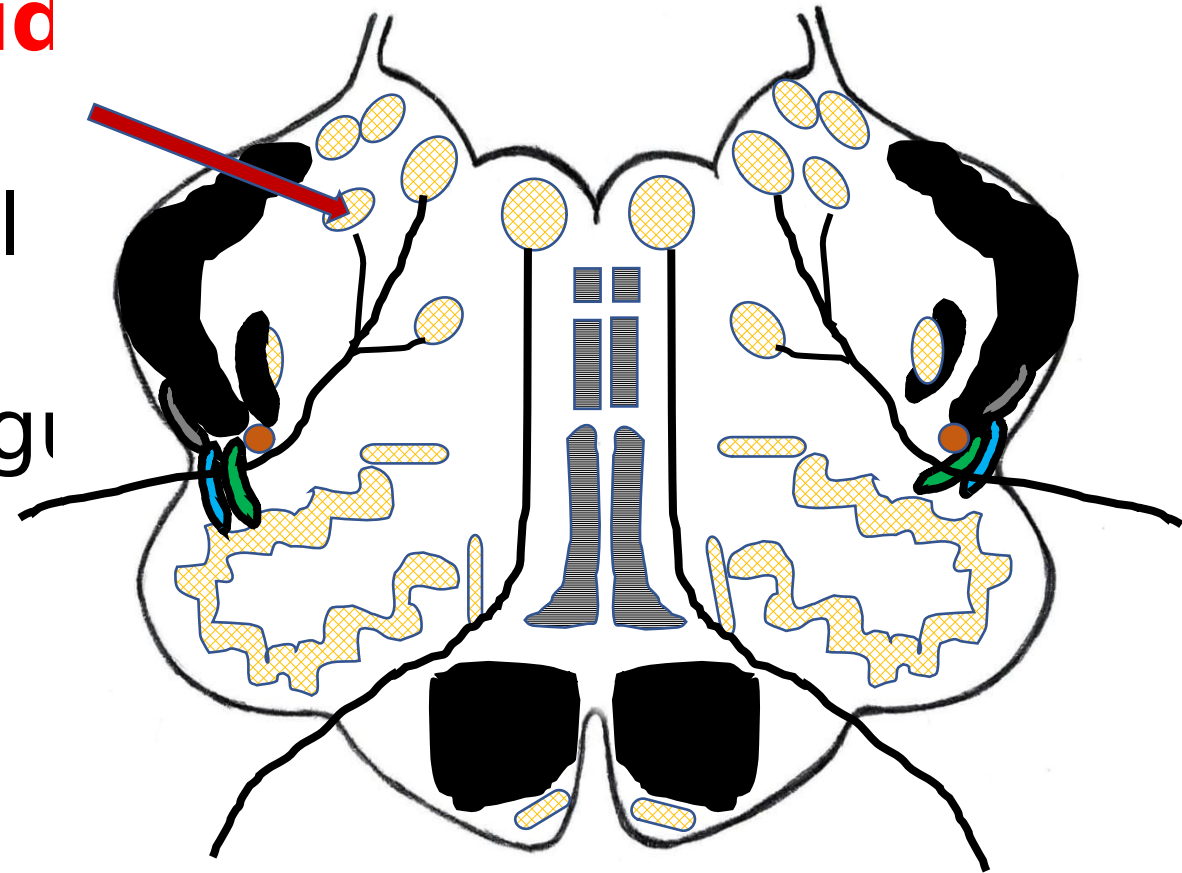


Lecture Quiz



• Which of the following structure is indicated by the arrow in the provided

1. Spinal nucleus of trigeminal
2. Hypoglossal nucleus
3. Dorsal motor nucleus of vagus
4. Medial vestibular nucleus
5. Nucleus solitaires

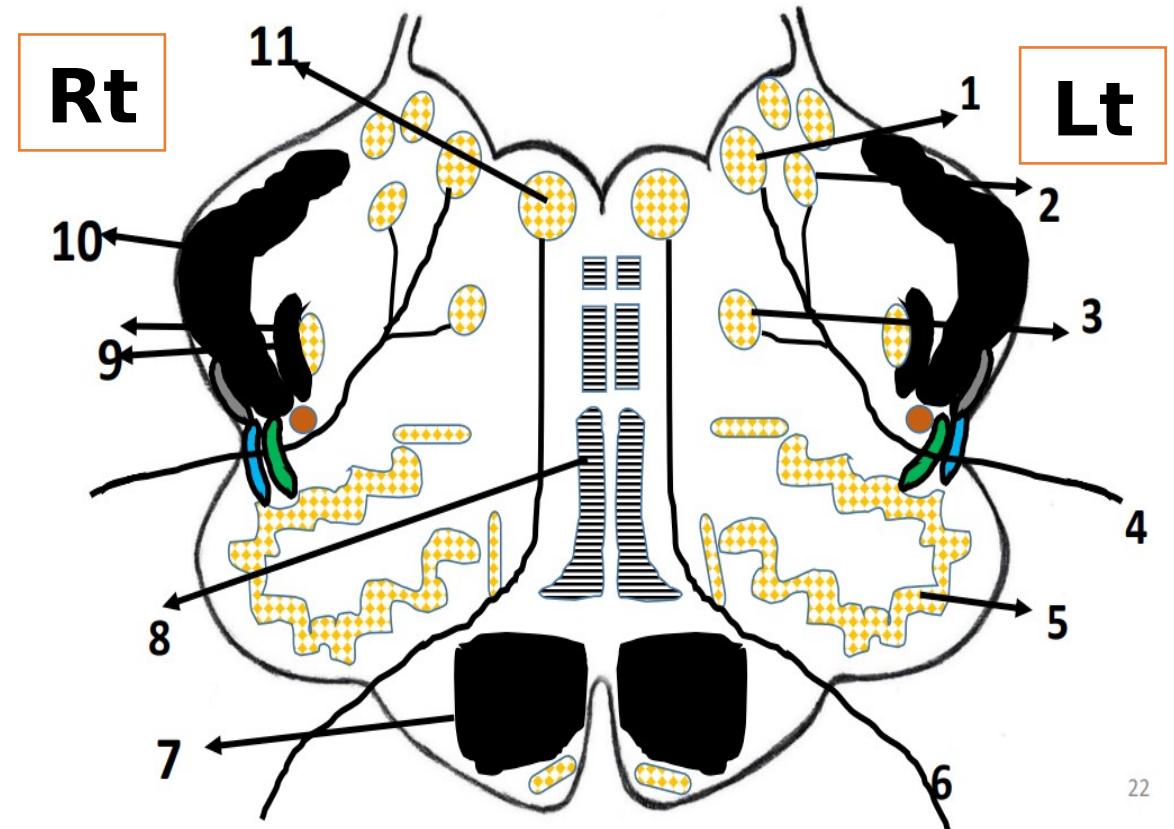


Lecture Quiz

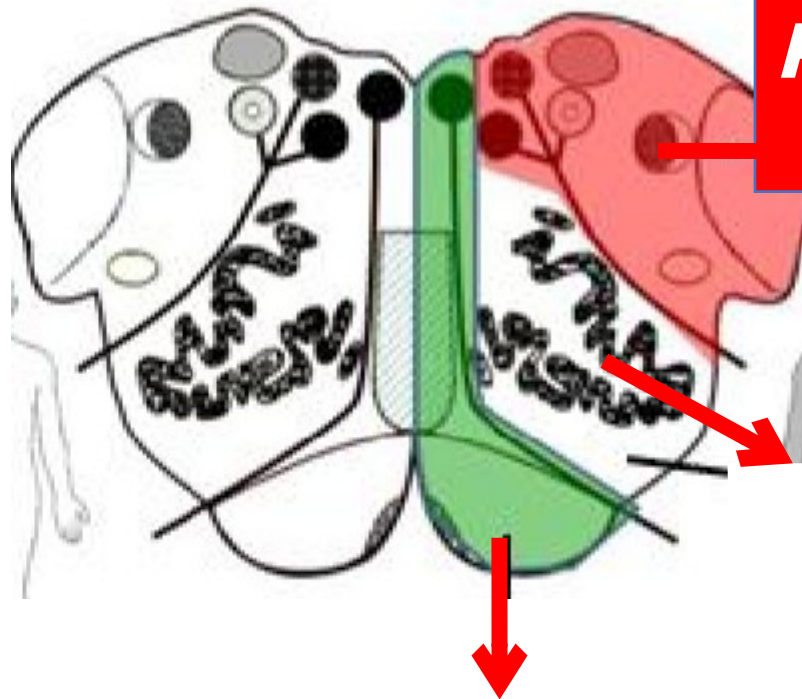


- Which of the following tracts carry **conscious proprioception** from the **left** side of the body?

- a. 3
- b. 6
- c. 9
- d. 8
- e. 10



Blood supply of the medulla



Posterior inferior cerebellar artery (PICA):

supplies **lateral part** of MO.

Medullary branches of vertebral artery (olive).

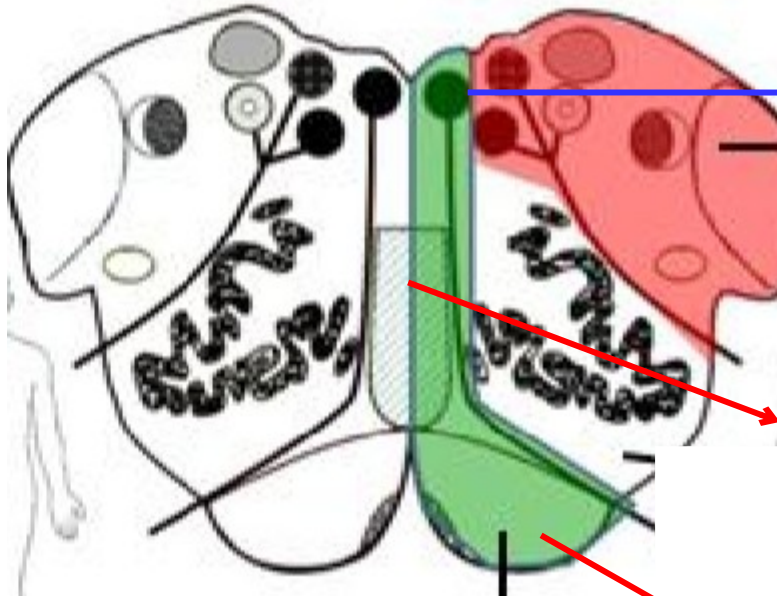
Anterior spinal artery

supplies the part **medial to hypoglossal nerve** (containing XII nucleus, medial lemniscus & pyramid).

Anterior spinal artery occlusion



Medial medullary syndrome



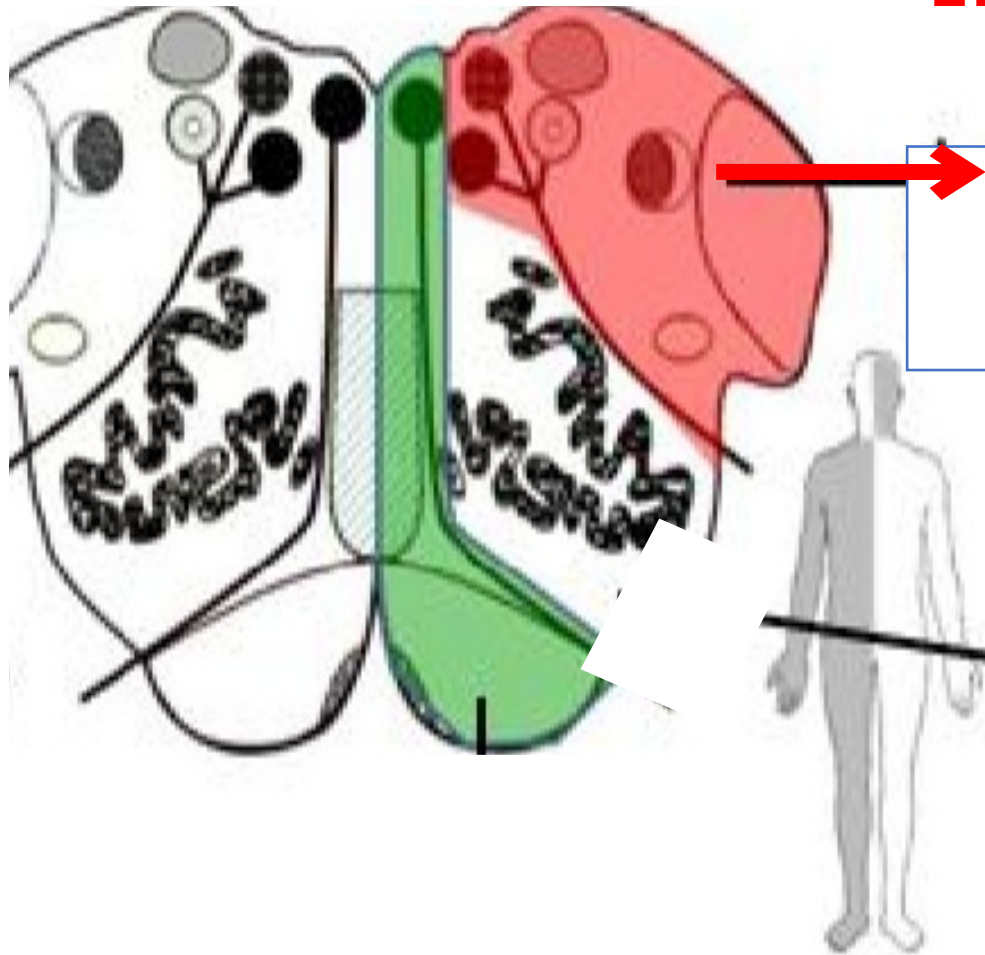
XII nucleus □ ipsilateral LMNL paralysis of tongue muscles

Medial lemniscus □ contralateral loss of proprioception & fine touch

Pyramid □ contralateral hemiplegia



PICA occlusion



lateral medullary syndrome

cerebellar

ataxia.

- b. Spinal Nucleus of V □ ipsilateral loss of pain & temp. from face.
- c. Spinal lemniscus □ contralateral loss of pain & temp. from body.
- d. Nucleus ambiguus □ ipsilateral paralysis of palate, pharynx, larynx.
- e. Nucleus solitarius □ loss of taste sensation.

Lecture Quiz



• **Lateral medullary syndrome affects which of the following internal structure of the medulla?**

- 1.The pyramids.
- 2.The inferior olive.
- 3.Inferior cerebellar peduncle.
- 4.Medial lemniscus.
- 5.Hypoglossal nucleus.

Thank you